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to be drawn up by the pack-thread, and the rope is to be passed once or twice round the bed-post; by the friction thus occasioned, a man may lower in safety a woman or two children in the bag, and may afterwards lower himself by getting into the bag, retaining hold of the rope.

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No. XX.

SLIDING AXLE.

*The SILVER ISIS MEDAL was voted to Mr. W. TINDALL, of Leeds, for his Sliding Axle; a Model of which has been placed in the Society's Repository.*

THE novelty of this contrivance consists in placing in the axle of the wheel itself the apparatus necessary to enable it to move obliquely. It may be applied to the front wheel of a three-wheeled carriage, and, with a little modification, to the front wheels of a four-wheeled carriage. It has not hitherto been applied to use, and its novelty and ingenuity are the chief motives that have induced the Society to lay it before the public.

The axle *aa*, Plate XIII. figs. 1, 2, and 3, contains the apparatus in itself which allows the wheel to be turned either to the right or left; it is, therefore, hollow, and the front bar of the carriage-frame *bb* passes through and is supported within it. This bar *b* has vertical pivots *cc*, shewn separate in fig. 4, on which the axle and wheel turn obliquely, either right or left, as shewn by the dotted lines in the horizontal section of the wheel *dd*,

fig. 1, in the section of the axle, fig. 2, and as applied to a carriage-frame, fig. 5. The box is rivetted at *ee* in the nave, or solid spokes of the wheel *dd*; the axle is made in two similar parts, which enter on opposite sides of the wheel, and are then united by four screws *ff*. Fig. 6 is an outside end view; fig. 7, an inside view; and fig. 8, a side view of one part of the axle separate. Fig. 6 and the horizontal section, fig. 2, shew how the perforation is bevelled to allow the axle to turn or lock on the bar *b*. *gg* two flat projections from the axle, which form the turning plates; they support the bar *b*, and by their close contact keep the wheel upright and relieve the pivots *cc*, as shewn in the hind view, fig. 3. *hh*, fig. 3, projections below, to which the shafts or the pole *ii* are jointed. Thus the wheel carries the whole apparatus within it for turning or guiding the carriage. But to effect this purpose the axle must either be very thick or very short. The wheel, therefore, depends on the shoulders or rims *jj* for its steadiness on the axis. The pole or shafts require either to be jointed to the turning-plates at *hh*, to prevent any strain or girding of the plates against the bar *b*, or to have a curved arm *z* turning on a centre in an arch over the wheel, as fig. 18. Figs. 9 and 10 shew the application of this principle to a pair of front wheels: here the plates *gg* are both on one side of the wheel, above and below the bar *b*, it rubbing between them: this equally well keeps the wheel upright, and the screws *ff* can be better applied on the other side. *kk*, the pole; *ll*, a parallel bar, which moves the two wheels together; this may be removed to the back at the dotted lines *mm*, if preferred.